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Spanish *Indignados* and the evolution of the 15M movement on Twitter: towards networked para-institutions

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Abstract:
The Arab Spring, the Spanish *Indignados*, the Occupy Wall Street movement, the #YoSoy132 movement, the protests in Istanbul's Taksim Gezi Park, the Brazilian Spring (#jan25, #arabspring, #15M, #ows, #YoSoy132, #occupyGezi, #vemprarua): in the last three years the world has witnessed the emergence of networked citizen politics. These movements are not institutions, but oftentimes mimic their nature. At the same time, they are unlike traditional citizens' movements, but very much alike in their decentralized structure. Networked citizen politics, characterized by decentral ization, swarm like action and an intensive use of information and communication technologies have been playing an increasing role in worldwide protests and movements, often overtaking and circumventing the actions of governments, parliaments, political parties, labour unions, non governmental organizations, mass media and all kinds of formal democratic institutions. Taking the case of Spanish *Indignados*, we analyse the nature of networked citizen politics as an extra representational kind of political participation for instance, the pervasiveness of Twitter's use in the 15M movement. We begin by characterizing users, including a description of how movements propagate from one to another. Next we explore the bonds between networked citizen movements and formal democratic institutions and how they relate to each other, especially the movements with political parties and mass media. We also examine how networked citizen politics may use tools similar to those of the so called Politics 2.0 but with very different purposes and, accordingly, the result is of the two conflicting approaches. Our analysis shows that different movements that is, 15M and 25S act as a continuum for networked citizen politics that use the Internet as the support for new institutionalisms, and despite the lack of traditional organizations, people, practices and ideas are shared and used as foundations for further action. Nevertheless, there is almost no inter institutional dialogue, with exceptions being individuals belonging to minor and left wing parties.

Keywords: 15M, Spanish revolution, *Indignados*, Twitter, social network analysis, institutional politics

Introduction

The Spring of 2011 will appear in history books as a period of worldwide unrest, revolts, uprisings and even revolutions, most of them lasting or replicating until Fall, or simply left unended. In Spain, the Spanish *Indignados* took to the *plazas* and camped in settlements called *acampadas*, starting on the night of May 15th and staying for several weeks. The movement quickly spread all over the country, with information and communication technologies (ICTs) being crucial instruments for coordination, communication and (political) deliberation. Among all these technologies, Twitter played an important role

both within and, as we suppose, outside the movement, to get in touch with other citizen organizations, media and formal democratic institutions, including members of the Parliament and political parties at large (Toret).

One of the main questions that have arisen has been whether these movements are as emergent as they seem, or have instead been designed, promoted, fostered and led by political parties or civil society organizations. There is quite a lot of evidence that offline political activism is closely tied to online political activism, and that being online is also a good gateway for political participation. In this regard, Rainie, Purcell and Smith and the Institute for Politics, Democracy and the Internet have both measured the strong relationship between a person being politically committed online (an "online influential") and his/her own offline political activity.

What we do not know is whether people who are politically active in their communities are similarly active online, or whether it is just the opposite. On this point, Katz, Rice and Aspden found that "Internet users were more likely than non-users to engage in traditional political activity in the 1996 general election" (416). This statement could be difficult to validate if we looked only at traditional parties, because, as Norris and Curtice note, "the online population is most predisposed to engage in cause-oriented forms of activism, characteristic of petitioning, demonstrating, and contacting the media over single-issue politics and civic-oriented activities, such as belonging to voluntary associations and community organizations" (16). And that is the very essence of the *Indignados* or 15M movement in Spain. Self-expression and other post-materialist values could be taking up with other survival-centred values, leading us to an intergenerational shift in values (Inglehart).

That said, if there is a shift in values working hand in hand with a shift in participation strategies, can it be said that the *Indignados* movement, along with others of its kind, is pushing political participation towards the field of extra-representational participation (Cantijoch)? If that is so, how are democratic institutions such as governments, parliaments or political parties in dialogue with these extra-representational political ways of participation? What about media?

While the statement that "technology [is enabling] more effective forms of collective action" should be supported with more evidence in the future, it is true that present trends already make it advisable to "explore ways to structure the law to defer political and legal decision-making downward to decentralized group-based decision-making" (Noveck). We assert in this paper that we have found more evidence of new ways of extra-representational participation, a means of political participation that is growing. Nevertheless, there seem to be increasingly stronger liaisons between these movements, political parties especially minor and left-wing ones and media, the latter mediating between social movements and more disconnected institutions (governments, parliaments, and major and right-wing parties). On the other hand, this dialogue is possible partly because of the pseudo-institutionalization of social movements. If we trace the evolution of such movements, despite their decentralization and lack of visible leaders, they show an emergent characteristic of flocking together and behaviours that are comparable to those of formal institutions, from an outsider's point of view.

Framework

Internet and politics

Our first assertion about the Internet, politics or political participation, and engagement is that they have a positive relationship. Borge and Cardenal found that "use of the Internet

has a direct effect on participation independently of motivation" (23). In other words, in addition to the standard reasons for political participation, access to the Internet is increasing this willingness to participate online. In this sense, access to the Internet reinforces online participation. This is a confirmation of other authors who dismissed former suspicions about the Internet alienating and isolating people from their community in general, and from politics in particular. On the contrary, "being involved in effortless political activities online does not replace traditional forms of participation, if anything, they reinforce off-line engagement" (Christensen). Of course online political participation requires a certain set of skills and capabilities (Peña-López, "Disempowering") that not only enable citizens to participate online, but that actually increase the probability of their doing so (Borge and Cardenal).

It is worth noting, however, that even if the Internet has a positive impact on online participation and if this online participation correlates with offline participation, this does not necessarily mean that offline participation has to be understood as normal. In fact, it has already been found that greater Internet use does not correlate to being more interested in a political campaign, nor even to being more prone to following official cyberpolitics.[1] Online campaigns, therefore, would be addressed not to the whole of the online population, but only to those who have influence, both online and offline. Indeed, major media have not been replaced by online or independent media, and still have enormous influence in political matters, both online and offline (Sampedro, López Rey and Muñoz Goy).

This is but yet another confirmation of the knowledge gap hypothesis (Tichenor, Donohue and Olien), as Anduiza, Gallego and Jorba have also found. They show how the Internet acts as a knowledge gap amplifier in their analysis of general elections in Spain. Nevertheless, they also find that a certain degree of serendipity is actually at work: besides the negative impact of the Internet on equity of access to information and participation, it is also true that the Internet exposes people to politics in more ways and with greater intensity in comparison to offline channels. A consequence of this is that differences in cognitive abilities increase unequal participation due to the impact of the Internet, while the impact caused by differences in motivation actually decreases. In other words, the knowledge gap closes between politically interested citizens and those not interested.

Related to that, Cantijoch also analysed the effects of the Internet on reinforcement and mobilization. She found, in addition to Anduiza, Gallego and Jorba's findings, that "institutionalised individuals are similarly increasing their likelihood of engaging in [online] activities in a mobilisation process" (17), which confirms the mobilization hypothesis; that is, that the Internet fosters participation. The most interesting aspect for us, though, is that she also found a complementary impact to mobilization, and that the Internet would reinforce a "pre-existing proclivity to engage in extra-representational modes of participation" (23).

Spanish users and politics on the Internet

In addition to the above, there are two other characteristics of Spanish online politics. First, of course, there are exceptions to the general rule that we present here this research is partly concerned with these exceptions and second, the evolution of the Internet, Internet usage and online politics is still changing at a rapid pace. But both

characteristics are widespread and very common in Spanish politics and will contribute to understanding the results of this research.

On the one hand, and put very simply, citizens are using the Internet intensively most especially the so-called Web 2.0 and social media platforms and applications while institutions are not (Peña-López, "Striving"). This lack is not exclusive to the political arena it can be observed in many other institutions also but politics being so oriented towards dialogue, it makes this lack even more obvious. This is not to say they do not use Web 2.0 or social media at all, but rather that their use of it is merely technical or mechanical, as it were, without an underlying change of philosophy or ethos. Take institutional use of political blogging, for instance. It is used in very unidirectional ways, campaign based and mainly used for spreading the party line (Criado and Martínez Fuentes).

This subversion of the enormous potential of the Internet and the attempt to control the message has created a sort of division between formal and informal online politics. If we add the rejection of formal politics to the increasing shift towards extra-representational participation and the motivational push of the Internet, it is not surprising that "online campaign exposure actually increases abstention […] and the odds of voting for minor parties" (Padró-Solanet 18). In other words, a growing minority of Spaniards is moving away from formal politics, partly alienated by intensive use of the Internet.

Another important consideration about online politics in Spain is that, in general, sociodemographic characteristics explain most Internet use and online political activities among Spaniards. But with regard to political ideology or positioning, Spanish Internet users are significantly more prone to be left-wing than the average Spaniard (Robles Morales). This aspect has no explanation in classical theories such as social class and can only be indirectly explained by factors that we have already mentioned.

Twitter

If online politics are a reality in Spain with the caveats noted above Twitter is, arguably, already playing a major role in general elections there (Izquierdo Labella). There are, however, some observations to be made on how Twitter is being used in politics in general and in Spanish politics in particular. On the one hand, Twitter is becoming an easy, cheap and above all quick space in which to broadcast opinions, discontent and calls for gatherings in real time. In other words, there may not be "Twitter revolutions" but revolutions are definitely tweeted (Lotan et al.). Besides providing broad coverage and widespread diffusion, Twitter is being used to classify and concentrate users and their attention to specific topics. These topics are usually fed by mainstream media, which passes them "to the masses indirectly via a diffuse intermediate layer of opinion leaders" (Wu, Hofman, Mason, and Watts).

The debate as to whether these flocks of people around different topics are all of the same feather is surely the most interesting part of it all. Wu et al. warn that the risks of high levels of homophily are very high, as the classification of topics and the concentration around them is made by the users themselves, since they explicitly opt-in to whom to follow. On the other hand, Kelly, Fisher and Smith leave the door open to some degree of ideological or political serendipity, as the openness of virtual spaces enables all kind of dialogues and "a range of policy preferences and ideological groundings and they talk to each other."

In the case of Spain, Guadián Orta, Rangel Pardo and Llinares Salas have shown that the relationship between the citizen and the message actually works in both ways. On the one hand, an emergent social network is dynamically created around a specific topic, based on who is talking about it, who is following it, who replies and who forwards the message. On the other hand, the very message is shaped by the social network and its influence on it. In the end, message and network make up an *ad hoc* set that evolves together over time.

15M

In a similar way, the *Indignados* movement began with a call to camp in Puerta del Sol, a central square in Madrid, on 15 May 2011, just a week before the municipal elections (Alcazan et al.). "15M demonstrators were younger, more educated [and] more likely to be women and unemployed" (Anduiza, Cristancho and Sabucedo 23). There also was a strong mobilization effect that brought to the streets people who did not participate in demonstrations. The movement called for "real democracy now" (Democracia Real Ya!, also known as DRY), and in many cases asked for people not to vote for major parties (#nolesvotes initiative). One of the main characteristics of the movement was its "decentralized structure, based on coalitions of smaller organizations" (González-Bailón et al. 5), with a strong stance against political parties and, most of the time, against labour unions as well. Some of these small organizations were created in May 2011, while others, such as the Movement of Mortgage Victims (Plataforma de Afectados por la Hipoteca, also known as PAH), were reinforced by the 15M movement.

Anduiza, Martín and Mateos characterize the participants in the 15M *acampadas* as having higher levels of political competence, deeply politicized ideals and low levels of trust in institutions, especially political parties. In their analysis, they differentiate between non-sympathizers of the movement, sympathizers that did not participate and participants. And although still a preliminary analysis, they conclude that participants ended up voting more in the general elections of 20 November 2011, and that their vote went to minor parties, with a definite bias to the left.

Indeed, unlike demonstrations taking place prior to the Information Age, with its physical and virtual spaces, what happened in the plazas and what happened on the Internet interacted and fed each other's spaces with information, coordination and a sense of collective identity. Just like the uprisings of the Arab Spring, the hybridization of the virtual urban space was crucial for the movement (Martínez Roldán; Castells, *Networks*). And Twitter played a major role in this hybridization.

Extra-representation or a process of institutionalization?

Research questions

It is relevant to know how the movements evolved over time, with particular focus on a double question: did they dissolve or maintain existence over time, and would they become institution-like social structures? Or, on the contrary, would they maintain their extra-representational forms, based on networks or platforms? Thus, we are dealing with two groups of related research questions: on the one hand, what are their characteristics both individually and collectively and how did these evolve over time? On the other hand, how did they relate, as a group, to other groups, especially institutions? In other words, we want to analyse their internal and external structures. Regarding the former, we

characterize the users: who they are, their gender, their socioeconomic status and professional and political profiles; what typologies can be developed from these characterizations; what their relationship was to the territory. From this, we hope to be able to determine if this is an urban phenomenon like most other industrial movements.

With respect to their evolution, we will analyse the movement at three moments in time: during 15 May 2011 (15M) and the following days; at its first anniversary and the global movement of 12 May 2012 (12M15M); and during the events of 25 September 2012 (25S) when some influential actors from the movement laid siege to the Spanish Parliament until the general strike of 29 September (29S). We investigate how other citizens joined the *Indignados* in their *acampadas*. We are interested in seeing the thread that runs through these three moments in time, in what ways the different groups remained the same or changed, who the long-term participants were and, most important, why such different and continually changing types of organization took place.

For the sake of clarity, in Table 1 we summarize some basic characteristics of and differences between the 15M and 25S demonstrations.

Regarding the second issue, relating to relationships with other institutions (parties, media, labour unions), we explore whether there was any contact between this kind of extra-representative politics and political institutions, and how it evolved. Moreover, our intention is also to determine the capability of these movements to mobilize the citizenry compared to that of institutional politics. Summing up the previous questions, we would like to describe the relationships between the 15M and 29S and institutional politics, whether they share common concerns, liaisons or spaces. For instance, what was the role of the media in telling their stories and sharing their viewpoints?

Hypotheses

Our hypotheses are as follows:

- H1: Extra-representative movements like 15M or 25S are initiated by gathering a critical mass on social networking sites; they have an institution-like external structure (i.e., relationships with other institutions), while keeping an emergent and decentralized network-like internal structure (i.e., membership). We call these organizations para-institutions.

Table 1. The 15M vs. the 25S demonstrations

	15M	25S
Convener	Initially Democracia Real Ya!; progressively alternative collectives such as #nolesvotes, Juventud Sin Futuro, Anonymous	Coordinadora 25S
Kick off	15 May 2011	25 September 2012
Claim of the manifesto	Real democracy http://www.democraciarealya.es/manifiesto comun/ manifesto english/	Round up of the Spanish Parliament http://takethesquare.net/2012/09/25/ democracy is kept hostage on 25s were going to rescue it coordinadora25s/

- H2: Unlike institutions, which usually have an exclusive membership, citizen networks create para-institutions that share members among them.
- H3: The dialogue between political institutions and network para-institutions is weak but present, and tends towards the left of the political arena.
- H4: When dialogue is non-existent, mass media act as the channel through which political institutions (normally on the right) and network para-institutions speak to each other.
- H5: Dialogue and lack of tension decreases online participation. Conversely, lack of dialogue and tension spark participation and boost it beyond representational participation.

Methodology

To understand the phenomenon of the 15M, we analyse the messages that were sent via the Twitter social networking site. When looking at the results, it should be taken into account that there might be a certain bias in the data set, as part of the activity of the 15M movement was not reported in this microblogging network. However, we elected to examine this tool not because it in any sense caused, framed or even explained the movement a critique that Sádaba raises but because "the revolutions were tweeted," as claimed by Lotan et al., and as we will actually prove.

Data

Data were extracted from Twitter's API,[2] which provides information on the time and spatial coordinates of each tweet, information on the sender (name and alias, bio), number of followers and friends. Table 2 shows the interval of time, selected hashtags, number of tweets and number of users for the three data sets.

Demographic characterization

Twitter's policy establishes that only a username and an email address are required. Some users complete their profile with their name, location, a brief biography and their website. To try to correlate employment classifications, we looked for a set of more than 550 words related to professions into users' bios. Those words were encoded by sector, subsector and professional level. In this way we were able to group users by these categories. We use these metadata to infer the attributes listed in Table 3.

Evolution of the movements

To understand the evolution of the 15M movement through its information diffusion patterns, we study separately the different stages of the events, labelled as *Origin*, *Early*, *Boom* and *Late*. We select all users who retweeted a user or were retweeted by a user at least once in the corresponding data set of tweets. Then we draw a graph comprising a set of nodes and a set of edges. There is an edge that connects user A to user B if user A retweeted user B. Finally, we assign a weight to every edge which is the number of times user A retweeted user B in the corresponding stage.

Relationship between 15M and 29S and institutional politics

In order to analyse the relationship between the 15M movement, political institutions and the media, we generate graphs for the three periods: 15M, 12M15M and 25S. These

Table 2. Data sets and hashtags

Data set	Date of capture (from/until)	Tracked terms	Tweets	Users
15M	13 May 2011/ 31 May 2011	#15M, 15 M, #democraciarealya, #tomalacalle, #Nolesvotes, #spanishrevolution, #acampadasol, #acampadabcn, #indignados, #notenemosmiedo, #nonosvamos, #yeswecamp	1,444,051	181,146
12M 15M	01 May 2012/ 31 May 2012	#12M15M, #12M 15M, #12M, #15M, 15 M, 12 M, #spanishrevolution, #acampadasol, #acampadabcn, #indignados, #PrimaveraGlobal, #TomaLaCalle, #AnonOps, #hagamoscomoenislandia, #YoVoy12M, #desalojoSol, #volvemosalas5, #12mglobal, 14mMad, #Feliz15m, #Es15M	539,642	110,808
25S	16 August 2012/ 31 October 2012	25S, #25S, asalto al congreso, @ocupaelcongreso, #ocupaelcongreso, ocupa el congreso, #tomaelcongreso, toma el congreso, 29 S, 29S, #29S, #voces25S, #vamos29S	1,394,114	289,001

Table 3. Inferred attributes

Attribute	Inferred from	Complementary data
Gender	Name	Spanish Institute of Statistics (INE), male/female names[5]
Geography	Location	Complemented by autonomous community and province after INE's table of municipalities and provinces[6]
Employment level	Description	Classified as manager executive, professional, support staff, manual worker, student
Tribe	Users	Classified users into the following categories: • Platforms (ACAMPADA, DRY, PAH, 25S) • Media/journalists • Parties/politicians (PP, PSOE, IUNIDA, UPYD, EQUO, CIU, ERC, ICV, COMPROMIS, PIRATA) • Labour unions (CCOO, UGT)
Join	Timestamp	15M: Origin: 13 14 May 2011 Early: 15 16 May 2011 Boom: 17 25 May 2011 Late: 26 31 May 2011 25S: Origin: 16 18 August 2012 Early: 19 August to 24 September 2012 Boom: 25 30 September 2012 Late: 1 31 October 2012

graphs follow the same method that we defined in the previous subsection but establishing edges between users based on mentions instead of just retweets. To quantify the influence of the tribes in each graph through their connectivity, we use the *k*-core decomposition (Seidman) based on the in-degree of the nodes. Then we group the *k*-index values of the users that form each tribe to compute the average, the maximum value and the standard deviation.

Additionally, to understand the relationship between the tribes, we remove the nodes that are not part of the predefined tribes and their edges. Then we collapse the nodes which belong to the same tribe into super-nodes, one per tribe. Therefore, the edges of these new nodes express the mentions between users that form the adjacent tribes of an edge. We also remove the edges with a weight lower than 10 to eliminate anecdotal interactions. Finally, we use the Louvain method (Blondel et al.) for community detection in these new graphs and characterize the interactions between tribes at a macro level.

k *Index decomposition.* *k*-Core decomposition is a technique for the evaluation of potential influencers in different social networks (Kitsak et al.). The *k*-core of a graph is the maximal subgraph in which each vertex is adjacent to at least *k* other nodes of the subgraph. In directed graphs such as the ones in this study, there exist two different *k*-core decompositions (for in- and out-degrees). A graph's node has a *k*-index equal to *k* if it belongs to the *k*-core but not to the (*k* +1)-core.

Community detection. The Louvain method is a greedy optimization algorithm to detect communities of nodes, also called modules, based on the modularity of the graph. The modularity is a function that quantifies a particular division of a graph into communities and obtains high values in graphs with dense edges between the nodes within communities and sparse edges between nodes in different communities.

Results[3]

We analyse the behavioural patterns that emerge over time between and within the three events: 15M, its first anniversary (12M15M) and the events of the 25S.

Data: participation of users in the events

First, we observe in Figure 1 that the 15M broke the general trend of immediacy of social movements: expectation and interaction lasted for days, and even transcended one event to cross into the other one.[4] Indeed, the number of total users on 15M (37,362) does not differ greatly from the estimated number of demonstrators on the streets.

Regarding coincidence between the three events, Figure 2 confirms the volatility of Twitter in the political engagement of users in several periods. Only 3.22% of all participants took part in the three events, 16.30% participated in at least two of them and 83.70% only participated in one of them, following Pareto's principle of participation.

Within the different events, Figure 3 shows a Pareto's power law in the tweets, retweets and replies distributed by users. In other words, there are a few users who are very active, while the rest show much less activity. Henceforth, we denote as *Persistent* the subset of users who participated in the three events.

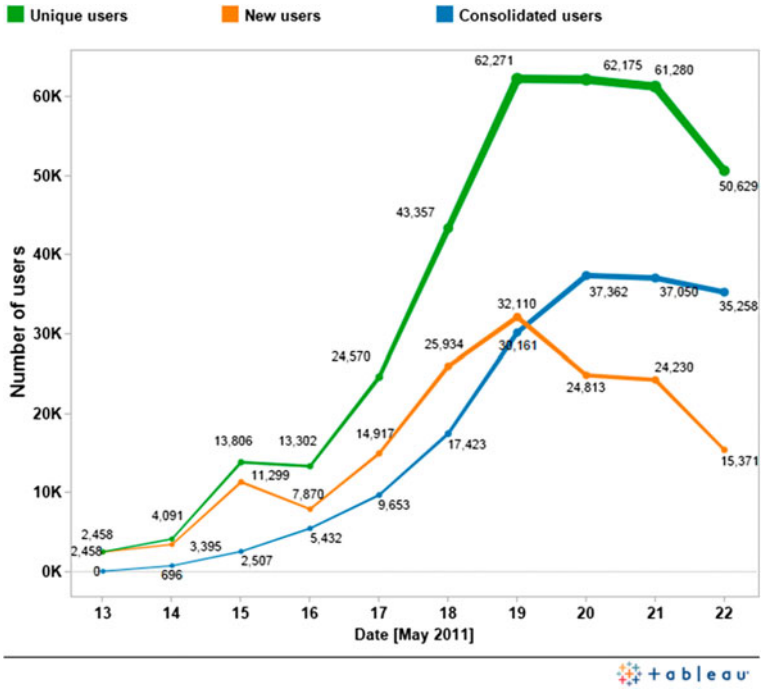

Figure 1. Participation of the users in 15M
Notes: Consolidated users are ones who had tweeted on previous days, unlike new users, who were new to the conversation. Unique users are the sum of consolidated and new users.

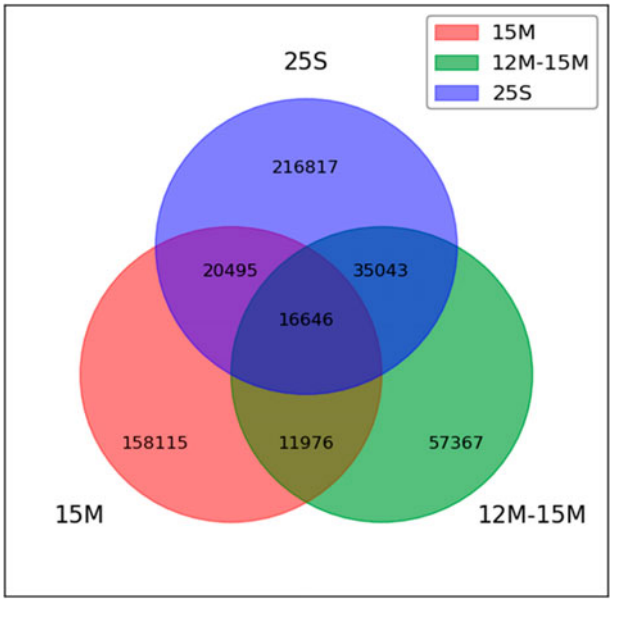

Figure 2. Participation of users in the three events

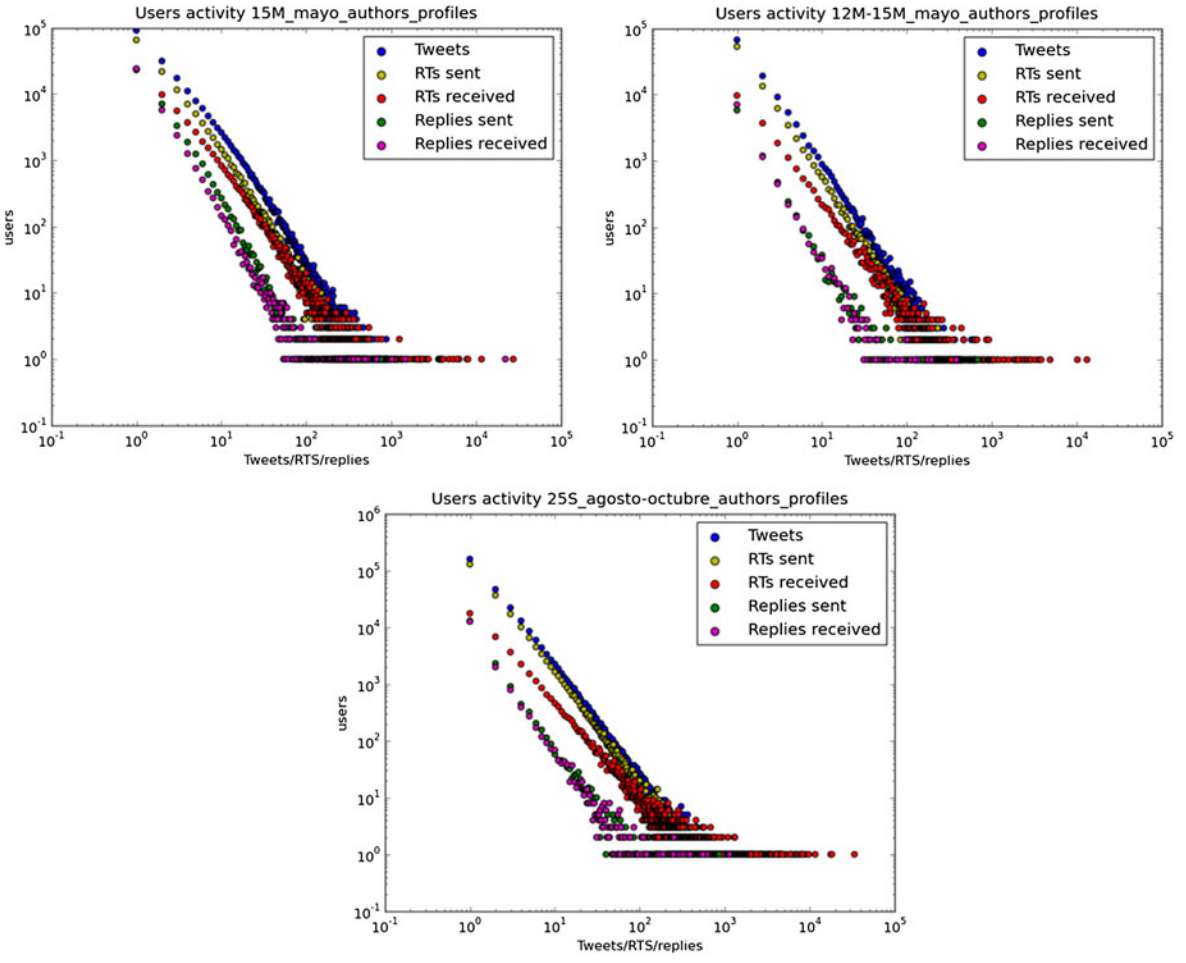

Figure 3. Tweets, retweets and replies by users during 15M, 12M15M and 25S

Demographical characterization

In this subsection, we characterize the users who tweeted during the 15M, 12M15M and/or 25S events in terms of geographical location, gender, employment level, role and tribe.

Gender. Gender has been identified for about two-thirds of users, as we show in Table 4. From 15M to 25S the percentage difference between women and men decreased considerably. However, the Persistent group is mostly male.

Geography. The geographical origin, shown in Table 5, indicates that Madrid, Catalonia, Andalusia and Valencia generated most of the messages. From 15M to 25S the percentage of tweets was located in the largest cities (Madrid and Barcelona). We also note that people from the Persistent group provide their location most frequently (53.08%) and they mostly belong to large cities, especially Madrid (16.73%).

Employment level. From the analysis of employment levels presented in Table 6, we found "professional" as the most common level, although the table shows a decreasing pattern in contrast to the participation of students. In the Persistent group the percentage of professionals was twice as high as that of professionals among common users.

Tribes. Table 7 shows no major changes in the distribution of tribes between the three events. This can be explained because these tribes are a very small group compared to the total of participating users (labelled as *Unknown*). Even so, it is interesting to note how the anniversary of the movement (12M15M) did trigger some interest from politicians and unions, as it also managed to co-opt some citizens into the ranks of activist platforms.

We also analyse in Table 8 what the participation level and the impact of the tribes were. First, we observe that platforms acted as (online) media with more relevance than mainstream media themselves. They were, though, much more active in terms of both broadcasting and establishing conversations with other users. This observation is even clearer when we normalize activity per number of users. While platforms interacted among themselves, media just performed their usual broadcasting. This is explained by the activity of platforms which retweeted and used original material from traditional media and not because media played an active role in terms of conversation and interaction.

Second, we find in Table 8 and Figure 4 that politicians and unions were mainly receiving messages without presenting any conversational pattern, similar to the media but even more extreme. Therefore, we observe through the retweets (RTs) and received mentions that platforms and citizens in general (Unknown) questioned and interpellated their representatives, but these seem not to be replying to the citizens, according to their number of published tweets per user.

Table 4. Distribution of users by gender

Gender	Persistent%	15M%	12M15M%	25S%
Men	43.88	43.92	38.51	37.93
Women	23.12	23.78	26.74	27.44
Unknown	33.00	32.30	34.75	34.63

Table 5. Distribution of users by geographical areas

Location	Persistent%	15M%	12M15M%	25S%
Andalusia	6.61	4.82	6.22	6.44
Aragon	1.77	1.22	1.50	1.12
Asturias	1.21	0.95	0.97	0.99
Balearic Islands	0.71	0.61	0.55	0.44
Canary Islands	1.10	0.95	0.95	0.88
Cantabria	0.48	0.31	0.38	0.36
Castile y León	2.64	1.99	2.27	2.23
Castile La Mancha	0.85	0.71	1.00	1.16
Catalonia	10.01	8.67	8.20	4.94
Ceuta and Melilla	0.06	0.05	0.08	0.05
Valencian Community	4.19	3.31	3.92	3.21
Extremadura	0.93	0.67	0.92	0.93
Galicia	2.43	1.81	1.95	2.14
Rioja	0.21	0.17	0.18	0.17
Madrid	16.73	10.87	10.74	9.25
Murcia	1.47	1.06	1.35	1.31
Navarre	0.50	0.37	0.39	0.37
The Basque Country	1.16	0.97	0.86	0.98
Unknown	46.92	60.51	57.58	63.04

Table 6. Distribution of users by employment level

Level	Persistent%	15M%	12M15M%	25S%
Manager executive	0.94	0.96	0.73	0.52
Professional	20.99	13.93	14.02	10.30
Support staff	0.35	0.28	0.35	0.37
Manual worker	0.32	0.25	0.33	0.35
Student	3.93	3.08	5.3	5.53
Unknown	73.47	81.5	79.27	82.93

Table 7. Distribution of users by tribes

Tribe	15M%	12M15M%	25S%
Platforms	0.05	0.24	0.12
Media	0.11	0.13	0.05
Parties/politicians	0.40	0.57	0.26
Unions	0.14	0.20	0.08
Unknown	99.29	98.87	99.50

Table 8. Activity by tribes

Tribe	Data set	Active users	Monitored user number	Tweets	Received RTs	Received mentions	Tweets/active users	Received RTs/ active users	Received mentions/ active users
Media	15M	282	422	11.103	66.924	123.336	39	237	437
Media	12M15M	243	422	3.982	42.234	67.512	16	174	278
Media	25S	220	422	4.581	96.831	144.363	21	440	656
Platforms	15M	233	405	12.386	71.776	231.010	53	308	991
Platforms	12M15M	154	405	10.476	39.010	56.597	68	253	368
Platforms	25S	131	405	13.015	102.798	152.515	99	785	1.164
Politicians	15M	834	3.704	9.958	9.012	39.946	12	11	48
Politicians	12M15M	689	3.704	3.766	5.233	14.721	5	8	21
Politicians	25S	751	3.704	6.939	33.801	74.589	9	45	99
Unions	15M	113	1.319	1.196	450	656	11	4	6
Unions	12M15M	285	1.319	2.236	2.292	3.306	8	8	12
Unions	25S	344	1.319	3.475	7.397	8.817	10	22	26
Unknown	15M	205.770	205.770	1.409.408	585.993	817.325	7	3	4
Unknown	12M15M	119.661	119.661	519.182	220.370	316.071	4	2	3
Unknown	25S	287.555	287.555	1.366.104	737.130	946.346	5	3	3

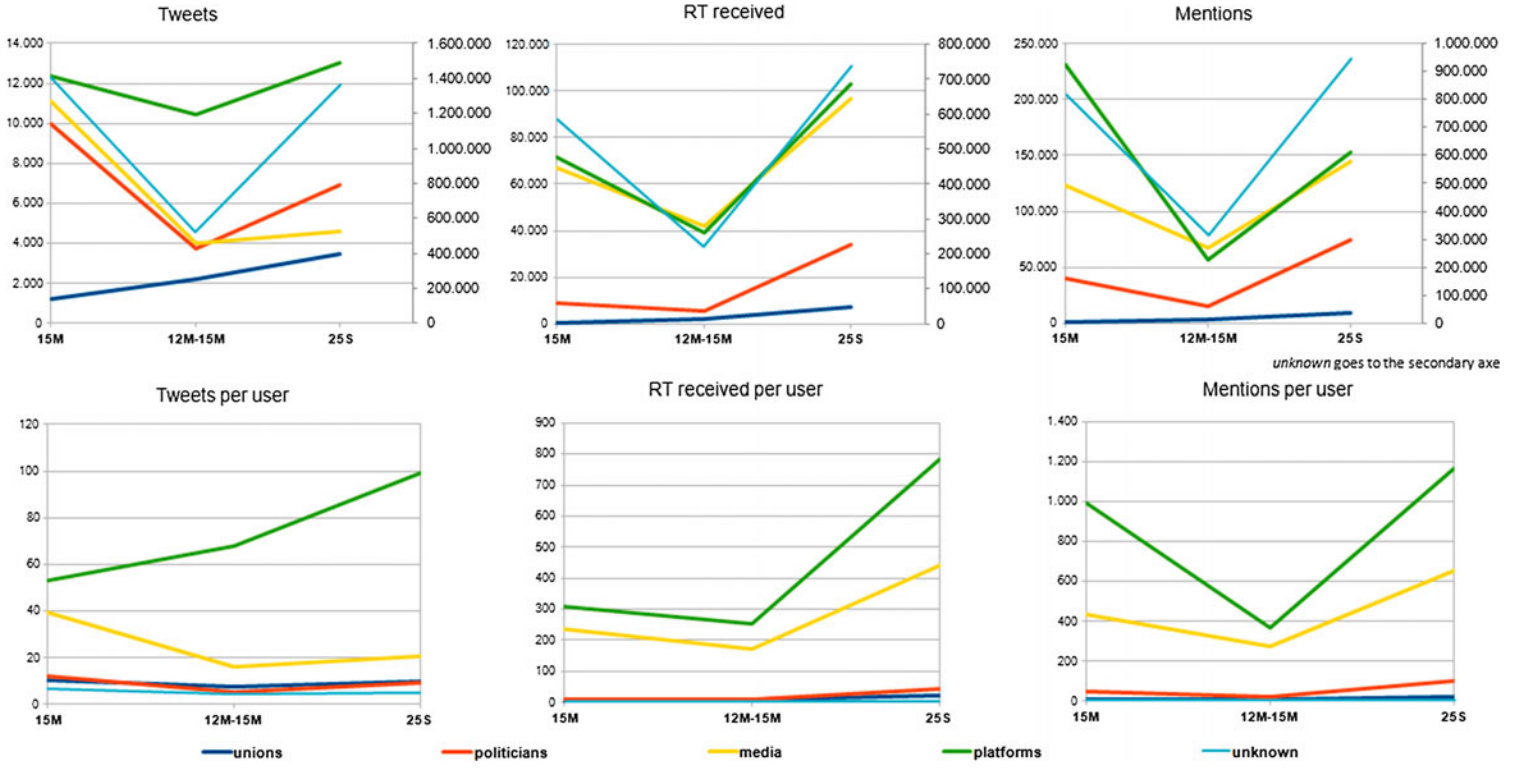

Figure 4. Activity by tribes

In conclusion, citizen platforms have occupied the public arena in terms of communication. While media do their usual business, politicians and (surprisingly) unions lag way behind in understanding and taking part in the new digital agoras. We also note that citizens at large (Unknown) follow the same pattern that public representatives do: despite the fact that in aggregated terms they outpace any other tribe, in terms of activity per user, their engagement still is very low. This is one of the reasons why we label citizen platforms as para-institutions: they are not institutions as we usually define them, but their behaviour is definitely institution like.

Evolution of the movements

We captured the formation and rise of 15M and 25S on Twitter. In both cases, we find that the first users who participated and received notoriety were often overshadowed by others who joined later. We also note that in the Boom period, there was a central core with many relevant users of different communities, but when the movement shifted into later stages, these groups became distanced from the main activities.

During the 15M movement, @democraciareal, the main convener, was quickly overtaken in the Early phase. On the other hand, the groups that claimed free culture (such as @bufetalmeida and @julioalons) were also overshadowed in the Boom stage. Two users who did not exist on May 15, @AcampadaSol and @acampadabcn, were finally the most enduring users. Figures 5 8 portray the evolution of the relationships established during each stage of the 15M.

As for the call for September 25 (Figures 9 12) it can be seen that in the Origin stage there is no central node playing a coordinating role. Instead, the major roles are played by individual users.

During the Early stage from August 24th to September 24th, a network around the call for a new event is created. The user @Coordinadora25S appears to explicitly coordinate the

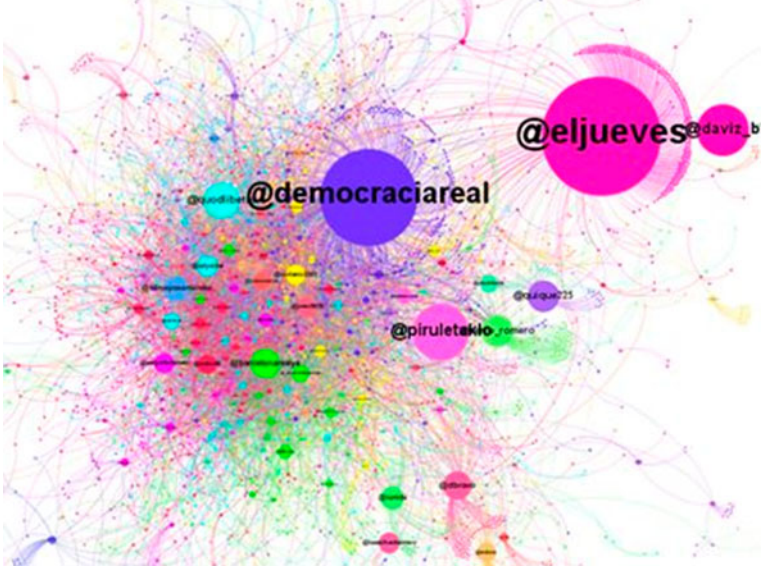

Figure 5. 15M map of RTs Origin

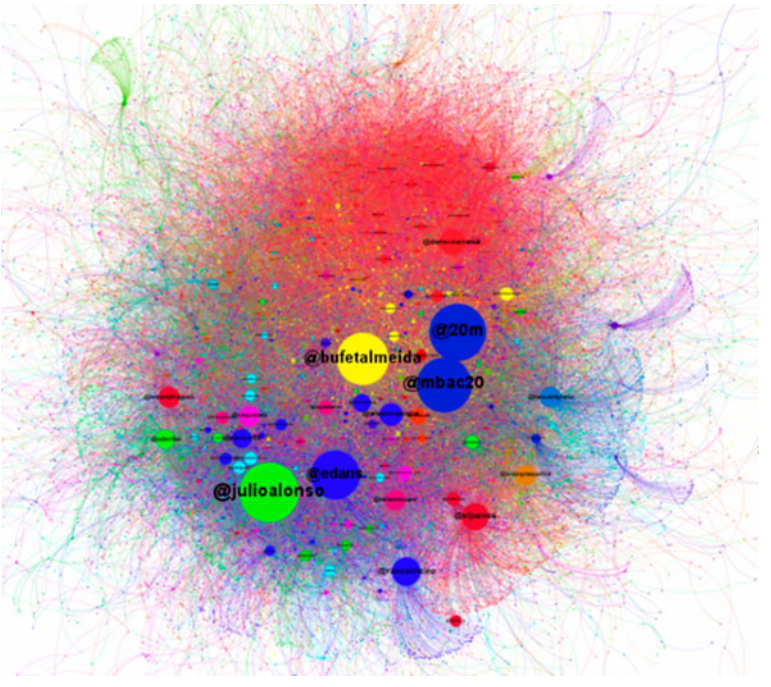

Figure 6. 15M map of RTs Early

movement, as do @OcupaelCongreso and @democraciareal. Only two of the initial users are still present in this stage. In the Boom of the call (September 25th to 30th), well-defined communities appear. The nodes that appear in the centre (centre right) are the platforms with a strong relationship with the media (centre left). The rest of communities are

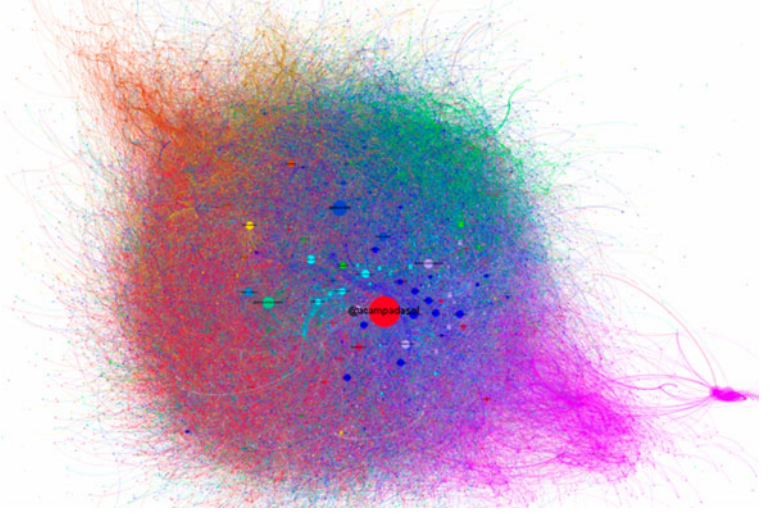

Figure 7. 15M map of RTS Boom

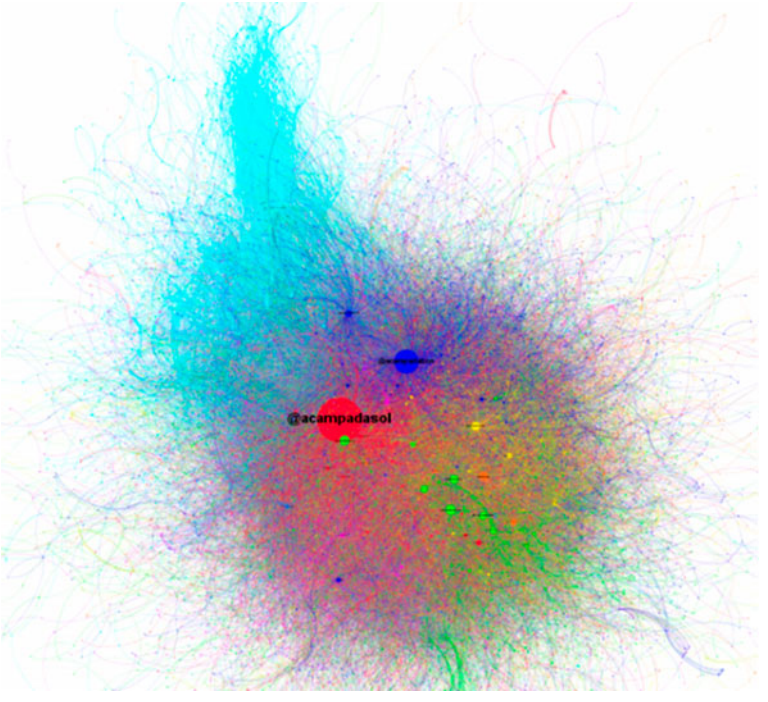

Figure 8. 15M map of RTs Late

populated by left-wing politicians (left) and the initial group (above) close to the *acampadas* (lower right). It is worth noting how the relationships of power of the initial group are now shared with other concurrent actors. Finally, the Late stage maintains the

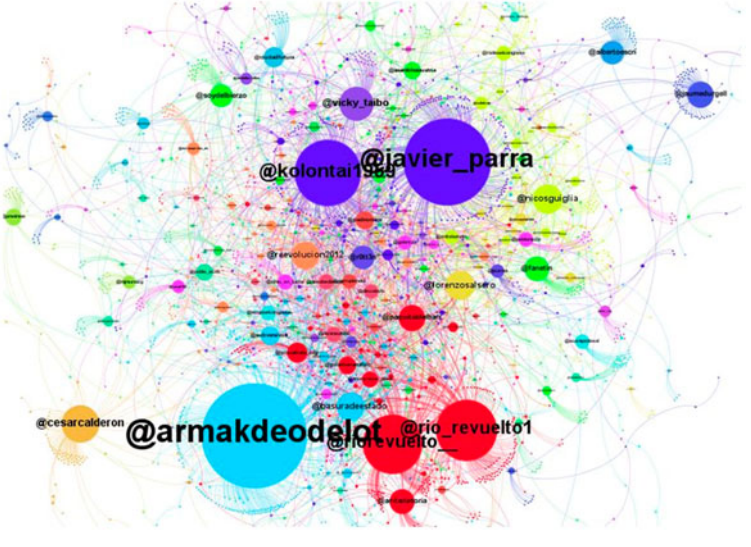

Figure 9. 25S map of RTs "Origin"

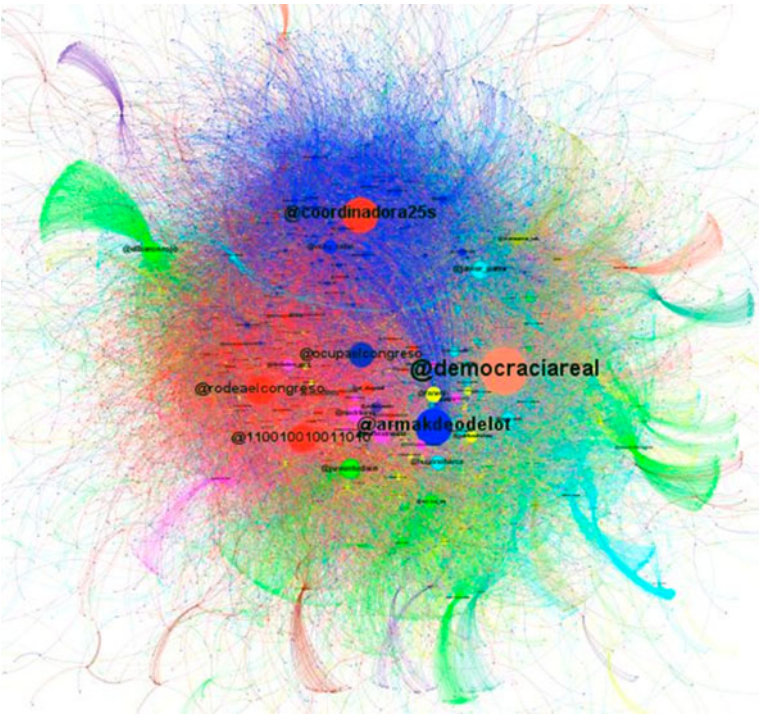

Figure 10. 25S map of RTs “Early”

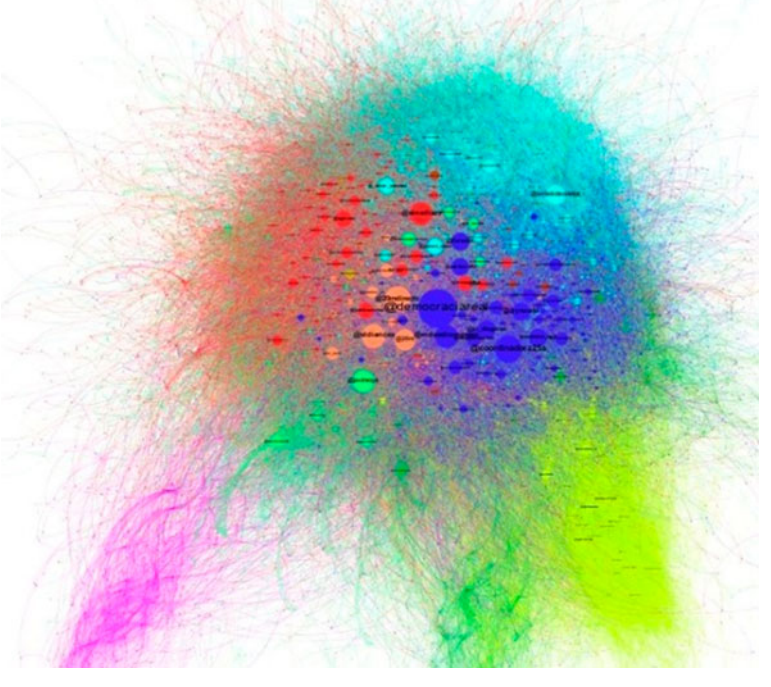

Figure 11. 25S map of RTs “Boom”

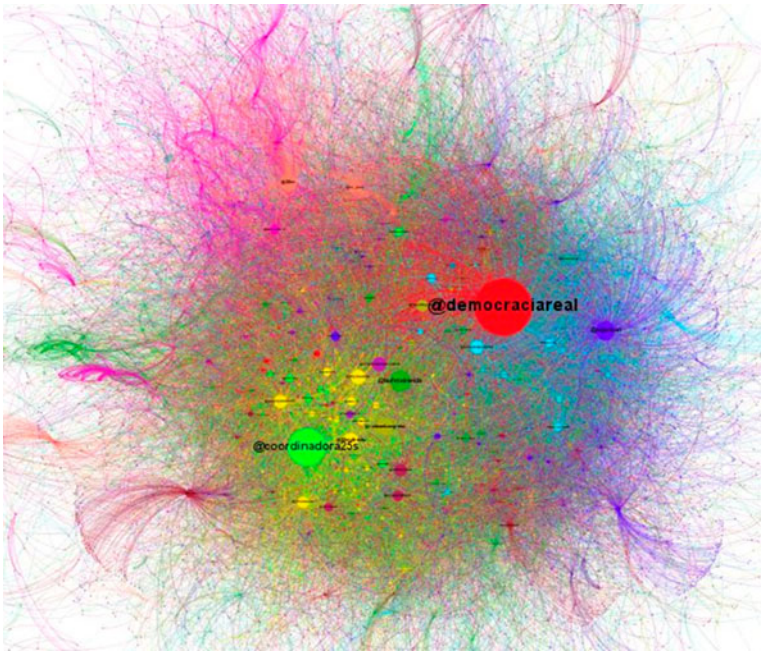

Figure 12. 25S map of RTs "Late"

spirit of the call of @Coordinadora25S and @democraciareal, but now splits among different communities.

Relationship between the 15M and 29S and institutional politics

In this subsection, we study the relationships among the 15M movement tribes, the mass media (channels, programs and journalists) and democratic institutions (parties and trade unions) in the mention graphs. For this purpose we analyse the connectivity of each group through *k*-index decomposition, and the connections between groups through the detection of communities.

k *Index decomposition.* Table 9 shows the maximum, the average and the standard deviation of the *k*-indices of the nodes which form each group in the three moments in time (15M, 12M15M and 25S).

In the 15M period, we observe that in almost every group there is at least one node with the maximum *k*-index (k_{max}=12), except for the CUP and COMPROMIS parties and the CCOO trade union. According to the average *k*-index, the 15M tribes (ACAMPADA, DRY and PAH) and the media are distinguishably the best-connected groups in this period ($k_{avg}\geq 7$). Next we note that the parties with the highest average *k*-index are the three newest ones: EQUO, PIRATA and UPYD ($k_{avg}\geq 3$). The trade unions and the rest of the parties obtain the lowest average *k*-index values, with no ideological ordering pattern ($k_{avg}<3$).

The results in the 12M15M period show that only the two main 15M tribes (ACAMPADA and DRY) and the media contain a node with the maximum *k*-index (k_{max}=19). In this period, DRY emerges as the best-connected group according to the

Table 9. Max k index, average k index and standard deviation of the k indexes of the nodes that formed the analysed groups during the 15M, 12M15M and 25S periods

	15M				12M15M				25S		
Group	k_{max}	k_{avg}	k_{std}	Group	k_{max}	k_{avg}	k_{std}	Group	k_{max}	k_{avg}	k_{std}
ACAMPADA	12	7.6	4.11	DRY	19	8.02	8	25S	22	21.67	0.75
MEDIA	12	7.31	4.28	PAH	17	6.04	5.95	DRY	22	10.34	8.8
DRY	12	7.23	4.94	ACAMPADA	19	6	6.79	ACAMPADA	22	9.65	8.45
PAH	12	7	5	PIRATA	17	4.3	3.85	MEDIA	22	6.92	7.53
EQUO	12	5.67	4.87	EQUO	17	3.88	3.45	EQUO	20	6.15	6.51
PIRATA	12	4.41	4.17	ICV	13	3.2	3.28	PAH	22	5.14	6.48
UPYD	12	3.28	3.63	IUNIDA	16	3.18	3.26	IUNIDA	22	5.11	6.74
IUNIDA	12	2.89	3.26	CCOO	17	2.82	2.98	CIU	13	4.16	5.2
PP	12	2.51	2.78	UGT	15	2.69	3.22	PP	22	4.13	5.89
PSOE	12	2.09	2.76	MEDIA	19	2.16	3.44	ICV	22	3.77	5.73
ICV	12	1.81	2.5	COMPROMIS	6	1.78	1.79	PIRATA	22	3.11	5.61
UGT	12	1.81	2.81	CUP	6	1.53	1.79	PSOE	20	2.48	4
CIU	12	1.68	2.46	UPYD	5	1.45	1.13	UPYD	21	2.16	3.98
CCOO	7	1.36	1.85	PSOE	17	1.19	1.75	COMPROMIS	18	1.84	4.55
CUP	3	1.25	0.83	ERC	14	0.99	1.95	CUP	6	1.82	2.21
COMPROMIS	8	1.13	2.36	PP	5	0.54	0.88	CCOO	22	1.53	3.28
ERC	12	0.97	1.87	CIU	3	0.5	0.7	UGT	22	1.4	3.07
								ERC	22	1.17	3.81

average *k*-index (k_{avg}≥7), followed by the other two 15M tribes (PAH and ACAMPADA) (k_{avg}≥7). The newest political parties, PIRATA and EQUO, are still the best-connected ones (k_{avg}≥3.88), while UPYD shows greater disaffection in the anniversary period (k_{avg}≥1.45). We also observe that the media do not play such an important role in this network when some left-wing parties (ICV and IUNIDA) and the trade unions (CCOO and UGT) get higher average *k*-index values.

In the 25S period, many groups contain at least one node with the maximum *k*-index value. However, we observe that in this period the average *k*-index value of the 25S group formed by the organizer accounts is significantly higher (k_{avg}=21.67) than the rest of the groups (k_{avg}<=10.34). After the 25S group, the best-connected groups are the two main 15M tribes (ACAMPADA and DRY) (k_{avg}≥9.65). The position of the media in the ranking is considerably higher than its position in the previous period (k_{avg}=6.92), and EQUO remains as the best-connected political party (k_{avg}=6.15).

Finally, we found that the standard deviation is notably higher in the best-connected groups, except for the 25S group, formed by just six accounts, in the last period. This indicates a greater diversity of values in high-connected groups, while in most parties the standard deviation is considerably lower because of the inactivity of most of their members.

Community detection. We also examine the relationships between groups, using the Louvain method for community detection, in the same three periods: 15M, 12M15M and 25S. Figure 13 shows the mention graph in the 15M period with two communities detected by the algorithm. The largest one is formed by the two main 15M tribes (ACAMPADA and DRY), the media, left-wing parties (PIRATA, IUNIDA, EQUO, ICV and ERC) and the trade unions (CCOO and UGT). The second community is formed by the three major parties (PP, PSOE and CIU) accused of corruption by the *#nolesvotes initiative*, part of the core of the 15M movement in this period and the liberal UPYD party.

Figure 14 shows the three communities in the mention graph of the 12M15M period. In this interval, when the first anniversary of the 15M movement occurred, the three 15M tribes (ACAMPADA, DRY and PAH) form one community. The media act as a hub in the second community formed by the trade unions (CCOO and UGT) and most of the political parties (PP, PSOE, UPYD, EQUO and PIRATA), except for two left-wing parties (IUNIDA and ICV), which appear in the third community.

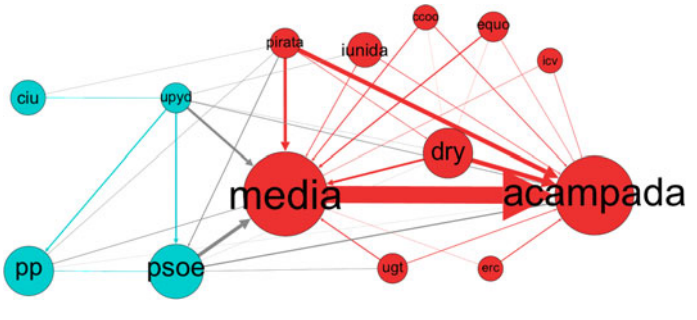

Figure 13. Mention graph of the analysed groups in the 15M period
Note: The size corresponds to the in degree of the node.

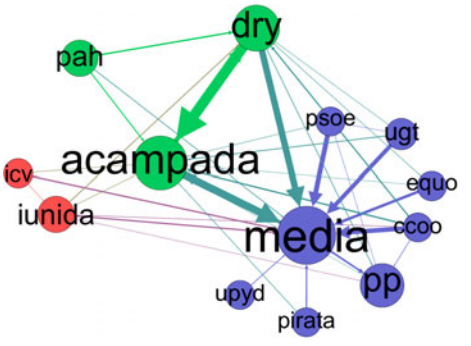

Figure 14. Mention graph of the analysed groups in the 12M15M period
Note: The size corresponds to the in degree of the node.

The three detected communities in the mention graph of the 25S period are shown in Figure 15. The 25S group forms a community with the newest political parties (EQUO, UPYD, PIRATA and COMPROMIS) and PAH. The two main 15M tribes (ACAMPADA and DRY) are found in a community interacting with the three major parties accused of corruption by the platform *#nolesvotes* (PP, PSOE and CIU). Finally, some left-wing parties (IUNIDA, ICV and ERC), the trade unions (CCOO and UGT) and the media form the third community.

Discussion

The 15M movement was born with the call to the first demonstration driven by the platform Democracia Real Ya! Authors like Piñeiro-Otero and Costa Sánchez, and González-Bailón et al. have identified the essential role of the online social networks Facebook and Twitter to generate and spread both the platform and the call. However, the movement did materialize in the offline world with the emergence of the *acampadas*, first in big cities but quickly spreading to smaller cities and rural areas.

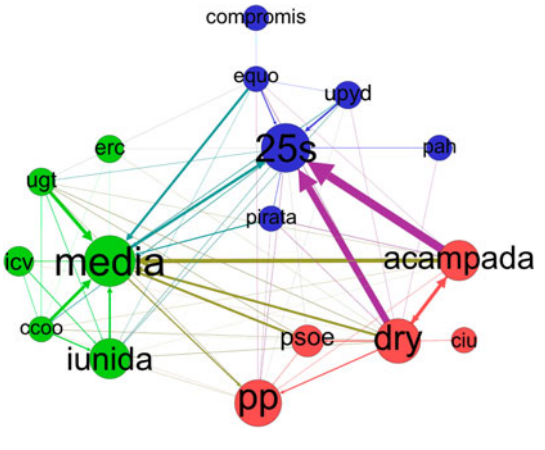

Figure 15. Mention graph of the analysed groups in the 25S period
Note: The size corresponds to the in degree of the node.

Totally lacking personal leaders, citizens flock around an idea or an explicit call to action, and thus a movement emerges. A significant trademark of the movement is that a collective identity is created, an identity that quickly overshadows more or less relevant individuals who could initially be identified. Collectively managed, "brands", mottos, collective users turn into real spokesmen and intermediaries along with other institutions such as governments, political parties, unions or the media. This dialogue legitimates the collective without the need for visible individuals.

The profile of the initial participant is increasingly balanced between men and women, and is a young adult, student, with a high educational level and involved personally or professionally with communications, telecommunications or technology. This profile evolves in the last period, when traditional activists join the protests and demonstrations, and the increase in labour union members shows this. What ties the community and its members together is a strong sense of common goals, strengthened in subcommunities made up of common professional profiles, ideology or friendship.

Online vs. offline

Unlike what common knowledge and mainstream media messages purports, there is a strong bond between the online and offline worlds of activism in the 15M movement. Despite the fact that the 15M and the subsequent events (12M15M and 25S) were initiated on the Internet, they quickly moved offline to occupy physical public spaces. Our first hypothesis is not only validated by this observation, but also by what Aragón et al. explained when comparing online and offline activities: growth of activity is parallel in both worlds, backed by political marketing and communication techniques.

We can state that these movements work as para-institutions, since they are perceived as institutions from the outside with explicit goals and targets, consolidated messages, collective identities that act as spokesmen while they preserve a network-like organization internally, as our analysis of the internal communication clearly shows. Indeed, the internal structure is nothing like the traditional structure of political parties, unions or other kinds of citizen organizations. With free movement and the possibility to participate, they use global digital networks in the most flexible way to enhance and enable any kind of participation (Castells, *Communication*), free in time, in space and in commitment. As we assumed in our hypotheses, members enter and leave the movement at will, or participate in different factions of it without major issues and, most important, without the movement as a whole even noticing.

Relationship between the 15M and 25S and institutional politics

Reinforcing what we stated before, despite the fact that many members enter or leave the movements, the movements themselves, taken as a whole, do survive like any other organization, hence their nature of para-institution. It is interesting to see how their collective identity evolves but persists through time and across the different calls and movements, from the 15M to the 25S and through the 12M15M. And this all happens with a most interesting characteristic: without any physical settlement of any kind.

These para-institutional networks maintain close relationships with each other, as shown in comparing the different movements and calls of the 15M and 25S. In the same way, they feel closer to the organizations that have similar flexible structures, such as some media or other network parties such as the Spanish Pirate Party or the recently formed Equo. Besides their closeness to network parties, it is not surprising that these

mostly protest movements maintain fluid communication with minor left-wing parties and unions — though they are neither part of them nor can be confounded with them, which is also clear from the data. A certain degree of confusion comes later, when the core of the movement begins to move aside and its space is taken by traditional actors of mobilization, mostly left-wing parties and unions. Most of the time, centre and right-wing parties keep a safe distance from the movement, or even isolate themselves from all the buzz and debate.

It is true, then, that the dialogue between emergent citizen movements and traditional parties is weak, and varies depending on ideology and the maturity of the movement. As time passes, major and right-wing parties maintain their isolation despite being constantly questioned by the movements, while minor parties try to get into the movement, and media and minor and left-wing parties take a growing but cautious approach (see Figure 4), which allows them to benefit from their political profile and relationship with independent activists (Elmer et al.).

Relationship with the media

It is beyond any doubt that in many moments of the movement, and for many actors, the media constitute the only link between the citizens and the institutions of democracy — governments, many parties and the legislative branch — the latter not present in the debate, but constantly questioned about the actions it should undertake. It is not surprising to see the media as the intermediators of a network organization, as shown by Adamic and Glance in their analysis of the political blogosphere and the central role of media in bridging the two sides of the political debate. But this "institutional journalism is threatened by the Internet" (Kelly) in the sense that once this mediating role disappears, political institutions and network para-institutions can — and some do — speak to each other and with the citizens with further mediation. We still see, however, the mainstream media playing a major role and maintaining a "strong symbiosis" between the citizen networks and other actors of the political arena (Kelly). But again, Kelly explains it for the blogosphere the same way it happened in the 15M: "the growing networked public sphere is not just changing the relationship among actors in the political landscape: it is changing the kinds of actors found there, and changing what 'media' is actually doing".

Extra representative participation

By comparing the actions online and offline of all democratic institutions and network movements, we can assert, in line with our final hypothesis, that the cause behind participation in these movements is unrest. This, of course, is not a new finding, but the novelty lies in the networks. When unrest cannot be channelled through representative participation — minor parties, unions, non-governmental organizations — as it was the case of 15M, extra-representative participation arises. And it does not arise in small clusters, but is articulated globally by means of digital technologies. The tremendous democratic potential of Internet mobilization is, undoubtedly, the reason behind past and current protests, and behind the differences in organization design, behaviour and evolution (Cristancho and Salcedo).

As Font et al. explained in the case of Spain, there is an unmet need for participation which formal politics just cannot fulfil. The need for more participation and the critical mass built in (i) large urban areas and (ii) through the Internet, plus the extremism caused by socioeconomic problems, has led the citizens to create a way around traditional

institutions. Indeed, when the citizenry trusts not politicians, but their own peers, the substrate for building a strong network has just been set.

It is unclear whether "movement-parties" defined as non-programmatic and non-bureaucratic parties will benefit from their advantage in exploiting the interactive potential of the Internet for political mobilization (Cardenal), and thus be able to interact and work with these new network para-institutions. We have already seen that, as time goes by, the igniting core leaves room for the masses to participate and, in the long term, is somewhat complemented by traditional actors. The question is whether the movement will ever be replaced by, or will merge with, these actors. So far, we have witnessed that the movement emerges as a collective representative and waits for other actors media, left-wing parties, unions to appear on the new political arena. It is too soon to tell whether these network para-institutions (i) will disappear after the current socioeconomic conjuncture; (ii) will complete the evolution to a formal institution (as some splinters of the movement actually did) and become a party or an incorporated lobby; (iii) will vanish into the larger program of a major party or union; or (iv) will be the seed of a new political paradigm based on network-centric organizational models.

Notes

1. See Sampedro, López Rey and Muñoz Goy for their use of the terms "political campaign" and "cybercampaign" (658).
2. https://dev.twitter.com/docs/streaming apis/streams/public.
3. The whole set of figures can be accessed in higher resolution at http://www.barriblog.com/idp2013/.
4. Evolution of 12M 15M (http://t hoarder.com/12M 15M/) and 25S (http://t hoarder.com/25S/).
5. http://www.ine.es/daco/daco42/nombyapel/nombres por edad media.xls.
6. http://www.ine.es/jaxi/menu.do?type pcaxis&path /t20/e245/codmun&file inebase.

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Pablo Aragón is researcher in the Social Media Group at Barcelona Media, where his main activity deals with crawling, analysing and visualising Big Data from the Social Web. He focuses on the study of communication dynamics and information diffusion in the context of political discussion

and emerging grassroot movements. This research aims to understand the evolution of interaction patterns and network centric organization models in local, national and international politics after the communicative revolution generated by the Internet and the online social networks. Additionally, he collaborates with the Internet Interdisciplinary Institute (Open University of Catalonia) in two research groups: "DatAnalysis15M" and "Internet, net neutrality, hacker ethics and digital culture". Pablo obtained a degree in Computer Engineering from the Universidad de Zaragoza in 2010.

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